when the instrument is out of action the tube lies horizontally, and the mercury lies on one side of the cistern, leaving the open end of the tube exposed to the air. When the tube is brought into a vertical position the mercury flows over and closes the mouth of the tube, and then flows down the tube to a greater or less depth, dependent upon the atmospheric pressure at the time. We have made a number of comparisons with a mercurial standard barometer, and find that its indications are correct to within about 0·12 inch. The readings, to the nearest tenth of an inch, or, by interpolation, to the hundredth of an inch, can be rapidly obtained. As a weather-glass it appears to be very useful, and even less likely to get out of order than an aneroid, but it would not be suitable for accurate scientific observations like an ordinary mercurial barometer. It has the advantage of being less costly, small in size, and easier of transport than an ordinary barometer.

WE have received from Messrs. C. F. Adolph and Co., of 14 Farringdon Road, E.C., their new price list of selenium cells and apparatus. This firm has introduced a new type of selenium cell which possesses the advantage over the old form of cell that it is exposed to the light on two surfaces with a consequent increase in the sensibility of fully 75 per cent. Complete sets of apparatus for demonstrating the sensitiveness of selenium to light and the transmission of sound by means of light are also described and illustrated in the list.

IN No. 21 of the *Physikalische Zeitschrift* Mr. Josef Rosenthal describes a number of improvements which he has introduced in the construction of mercury air-pumps of the Sprengel type. These pumps usually suffer from the disadvantage that the glass tube in which the mercury falls is liable to sudden fracture after the pump has been in action during a few weeks. The fracture appears to be due to the friction of the mercury on the glass producing an electrical charge which, by influencing the moist air without, converts the glass wall of the tube into the insulator of a condenser. The possibility of a discharge through the glass is eliminated by surrounding the dropping tube with a larger glass tube filled with oil, which acts as an efficient insulator. It is stated that a tube protected in this way lasted five months, although in daily use.

THE *American Journal of Science* for November, 1904, contains an investigation by Mr. Bertram B. Boltwood of the radio-activity of natural waters which is of particular interest because of an attempt that is made to explain its origin. It is shown that neither hot nor cold water dissolves any appreciable quantity of radium, as such, from a mass of finely powdered uranium minerals consisting principally of uranophane, although a brief contact with these minerals is sufficient to impart to water enough of the radium emanation to produce a very marked radio-activity. Water can also acquire a measurable quantity of the radium emanation by simple contact with gaseous mixtures which contain it. It is considered that an extremely minute trace of uranium minerals in the rocks and soils through which a water percolates would be sufficient to impart to it a measurable radio-activity. But waters such as those of Bath and Baden Baden, which contain true dissolved radium, must owe the presence of the latter to a special decomposition taking place under the influence of high temperature and great pressure.

MESSRS. LONGMANS AND CO. have in the press a translation, by Mr. J. Garcin, of M. Blondlot's papers on *n*-rays communicated to the Paris Academy of Sciences. The volume will contain additional notes and instructions for the construction of phosphorescent screens.

MESSRS. MACMILLAN AND CO., LTD., have published an edition of "An Elementary Course of Mathematics," by Messrs. H. S. Hall and F. H. Stevens, in which parts i. and ii. of the authors' "School Geometry" have been substituted for the parts of Euclid's elements contained in previous editions.

MESSRS. F. VIEWEG AND SON, Brunswick, have issued the fifth edition of Wiedemann and Ebert's comprehensive work on practical physics—"Physikalisches Praktikum." The book contains a good systematic course of practical work in physics, the experiments being well arranged and clearly illustrated.

THE issue of the *Antiquary* for January commences the first volume of a new and enlarged series. The magazine, which is devoted to the study of the past, has been enlarged by the addition of eight pages. A new section, called "At the Sign of the Owl," has been introduced, and consists of about two pages of notes concerning books of archæological interest. A good selection of articles is promised for the present year.

THERE has now been published at the Patent Office a subject list of works on the fine and graphic arts (including photography), and art industries, in the library of the Patent Office. The list consists of two parts—a general alphabet of subject headings, with entries in chronological order of the works arranged under these headings, and a key, or summary, to these headings shown in class order. The catalogue includes some 2916 works, representing 5373 volumes.

OUR ASTRONOMICAL COLUMN.

ANOTHER NEW COMET (1904 *e*).—A telegram from the Kiel Centralstelle announces the discovery of a new comet by M. Borrelly at Marseilles on December 29, 1904. The position of the object at 9h. 7m. (Marseilles M.T.) was

R.A. = 1h. 13m. 40s., dec. = −10° 0′,

and its apparent daily movement was found to be +1·6m. in R.A. and −54′ in declination. A nucleus was seen.

A further telegram states that the comet was observed by Dr. Cohn at Königsberg on December 31 at 6h. 22·2m. (Königsberg M.T.), when its position was as follows:—

R.A. = 1h. 15m. 56·53s., dec. = −8° 29′ 59″.

The position of the comet is near to that of θ Ceti.

COMET 1904 *d* (GIACOBINI).—Further observations of comet 1904 *d* are published in No. 3986 of the *Astronomische Nachrichten*, together with Herr Ebell's elements and ephemeris. A photograph taken at the Konigstuhl Observatory, Heidelberg, on December 19d. 17h. 37·3m. (Konigstuhl M.T.) showed a short tail and a complex nucleus, whilst the position of the object for 1904·0 was

R.A. (app.) = 16h. 19m. 38·8s., dec. (app.) = +28° 23′ 9″

OBSERVATIONS OF LEONIDS AT HARVARD, 1904.—Several observers at Harvard kept the eastern part of the sky under observation for meteors from 12h. to 17h. on the night of November 14–15. As a rule, four observers kept watch, whilst a fifth wrote down their results, and between them they saw 275 meteors, of which 183 were Leonids.

The following table shows the horary rate, for a single observer, at intervals of twenty minutes:—

Nov. 14–15 h. m.	Rate	Nov. 14–15 h. m.	Rate	Nov. 14–15 h. m.	Rate
14 40	40	15 40	28	16 40	24
15 0	36	16 0	26	17 0	28
15 20	29	16 20	25		

Of the total number 35 were of the first magnitude or brighter, but none exceeded magnitude −2·0. At the moment of explosion the heads were generally blue or white, but in two cases, at least, the colour was clearly red or

orange, probably indicating, according to Prof. W. H. Pickering, a different chemical constitution.

The radiant appeared to cover a considerable area, about 8° in diameter, and seemed to be double, the two principal centres being situated at R.A. = 9h. 56m., dec. = +24°, and at R.A. = 9h. 40m., dec. = +26°.

Although elaborate preparations were made for securing photographs, only two trails appeared on the resulting negatives. One, due to a Leonid, commenced at R.A. = 9h. 17·2m., dec. = +28° 57′, and ended at R.A. = 9h. 8·8m., dec. = +29° 52′, a more careful measure showing that the meteor passed through a point having the position R.A. = 9h. 57·0m., dec. = +24° 14′ (1855). The other trail extended from R.A. = 4h. 52·5m., dec. = +0° 52′, to R.A. = 5h. 10·7m., dec. = −4° 39′ (1855), and was, therefore, not due to a Leonid (Harvard College Observatory *Circular*, No. 89).

LIGHT-CURVE OF δ CEPHEI.—Employing the method used by Dr. W. J. S. Lockyer in his discussion of the observations of η Aquilæ (Göttingen, 1897), Dr. B. Meyerman has reduced the observations of δ Cephei.

As a result he obtained the following as the formula for determining the epochs of maxima :—

1840 September 26·3588 + 5·366404 E. (Bonn).

A comparison of the phases determined from this formula with observed values gives small differences which compare favourably with those previously obtained by other observers. The new observations are consistent with an invariable period (*Astronomische Nachrichten*, No. 3985).

STRUCTURE OF THE THIRD CYANOGEN BAND.—Some interesting results concerning the structure of the third cyanogen band have been obtained by Herr Franz Jungbluth at Bonn. By employing the third order of a Rowland grating having 630 lines to the millimetre (*i.e.* about 16,000 to the inch) and a focal length of 6·6 metres (about 21·6 feet), he obtained a greater dispersion than has hitherto been used for this purpose.

His results, stated briefly, are as follow :—(1) the third cyanogen band consists of double lines; (2) the maximum intervals between successive lines in the four strongest series form an arithmetical progression; (3) the view of King, that the inverted "heads" are to be regarded as "tails" of the bands connected with the known "heads," possesses a high degree of probability; (4) the connection of groups of "heads" and "tails" is such that the *first* "head" and the *last* "tail" belong to the same series, the second "head" to the penultimate "tail," and so on; (5) the hypothesis of Thiele, that the intervals between successive lines in a band increase only to a certain point and then *decrease* until the series ends in a tail, *appears to be correct*; (6) the lengths of the successive series form an arithmetical progression (*Astrophysical Journal*, vol. xx., No. 4).

NEW REFRACTION TABLES.—A set of new refraction tables whereby one may find the refraction correction to 0·01 of a second of arc are given in No. 3983 of the *Astronomische Nachrichten* by Dr. L. de Ball, of Vienna. The tables are adaptable to a range of atmospheric temperatures and pressures and of zenith distances. Knowing the temperature and pressure at the place of observation, one finds the logarithm of the actual density of the atmosphere from table i., and with this and the known zenith distance finds the refraction correction to the second decimal of a second of arc from table ii.

THE "ANNUAIRE" DU BUREAU DES LONGITUDES.—Continuing the scheme inaugurated in last year's "Annuaire" for the alternation of various subjects in the successive issues, the volume for this year contains, in addition to the astronomical data, tables regarding statistics, geography, &c., to the exclusion of data for chemistry and physics.

The astronomical section contains, among many other things, the following useful information :—A table for calculating the altitude from readings of the barometer, a complete table of the elements of variable stars of known periods, tables of stellar parallaxes, double stars and proper motions, and an article of stellar spectroscopy by M. Gramont, whilst the sun-dial, solar physics, the table of minor planets, &c., are reserved for the issue of 1906.

ECLIPSE RESULTS AND PROBLEMS.—In the December (1904) number of the *Bulletin de la Société astronomique de France* M. le Comte de la Baume Pluvinel reviews the results obtained during the total solar eclipses of the last thirty years, and in connection with the study of each eclipse phenomenon he outlines the problems which yet require further elucidation. To those interested in eclipse work the article will be found to be a useful *resume*.

BIBLIOGRAPHY OF CONTEMPORARY ASTRONOMICAL WORKS.—We have received from Prof. Ernest Lebon, of the Lycée Charlemagne, Paris, an extract from a plan of an analytical bibliography of contemporaneous writings on historical work in astronomy, as submitted by him to the International Congress of Historical Science held at Rome in April, 1903. Judging from the list of authors named in the plan and the specimen extracts given therein, the bibliography will be found extremely useful by those workers in astronomy who have occasion to refer to previous results obtained since 1846.

PRIZES PROPOSED BY THE PARIS ACADEMY OF SCIENCES FOR 1905.

GEOMETRY.—The Francœur prize (1000 francs), for discoveries or work useful for the progress of pure or applied mathematics; the Poncelet prize (2000 francs), for work in applied mathematics.

Mechanics.—A Montyon prize (700 francs), for the invention or improvement of instruments useful in the progress of agriculture, the mechanical arts or sciences; the Poncelet prize (2000 francs), for a work on applied mathematics; the Fourneyron prize (1000 francs), for a memoir on the theoretical or experimental study of steam turbines.

Navigation.—The extraordinary prize of 6000 francs as a recompense for any work tending to increase the efficiency of the French naval forces; the Plumey prize (2500 francs), for an improvement in steam engines or any other invention contributing to the progress of steam navigation.

Astronomy.—The Pierre Guzman prize (100,000 francs), for the discovery of a means of communicating with any celestial body other than the planet Mars; failing the award of the capital sum, the interest will be awarded every five years for a work important to the progress of astronomy. The Lalande prize (540 francs), for the observation, memoir, or work most useful to the progress of astronomy; the Valz prize (460 francs), and the G. de Pontécoulant prize (700 francs), under similar conditions. The Damoiseau prize (2000 francs); the question proposed for this prize is as follows :—there are a dozen comets the orbit of which, during the period of visibility, is shown to be of a hyperbolic nature. The problem set is to find out whether this was the case before the arrival of the comet in the solar system, going back to the past history of the comet, and allowing for the perturbations of the planets.

Geography.—The Gay prize (1500 francs), for an explorer in Africa who has determined with great precision the geographical coordinates of the principal points on his journey; the Tchihatchef prize (3000 francs), as a recompense or encouragement for naturalists of any nationality who have most distinguished themselves in the exploration of the Asiatic continent, more especially in the lesser known regions; the Binoux prize (2000 francs).

Physics.—The Hébert prize (1000 francs), for a discovery or treatise on the popular applications of electricity; the Hughes prize (2500 francs), for a work contributing to the progress of physics; the Gaston Planté prize (3000 francs), for a discovery, invention, or important work in the field of electricity; the L. la Caze prize (10,000 francs), awarded in one sum for works important in physics.

Chemistry.—The Jecker prize (10,000 francs), for work in organic chemistry; the Cahours prize (3000 francs), for the encouragement of young chemists; the Montyon prize, unhealthy trades (2500 francs and a mention of 1500 francs), for a means of rendering a trade less unhealthy or dangerous; the L. la Caze prize (10,000 francs), for the best work on chemistry during the last two years; the Bordin prize (3000 francs), for a memoir on the silicides and the part played by them in metallic alloys.

Mineralogy and Geology.—The Delesse prize (1400